MICHIGAN

FOREST PEST DETECTION PROGRAM

REPORT FOR 1962

COMPILED BY:

FORESTRY DIVISION, MICHIGAN DEPARTMENT OF CONSERVATION

COOPERATORS:

STATE DEPARTMENT OF AGRICULTURE, U. S. FOREST SERVICE, MICHIGAN STATE UNIVERSITY, UNIVERSITY OF MICHIGAN, PRIVATE FOREST INDUSTRY

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Cover: The cover drawing is of a forest tent caterpillar moth, the most important defoliator of aspen in Michigan.

INTRODUCTION

The Michigan Forest Pest Detection Program provides a coordinated approach to the problem of forest insects and diseases on a statewide basis, employing the facilities of the various cooperating agencies, each contributing in its respective field.

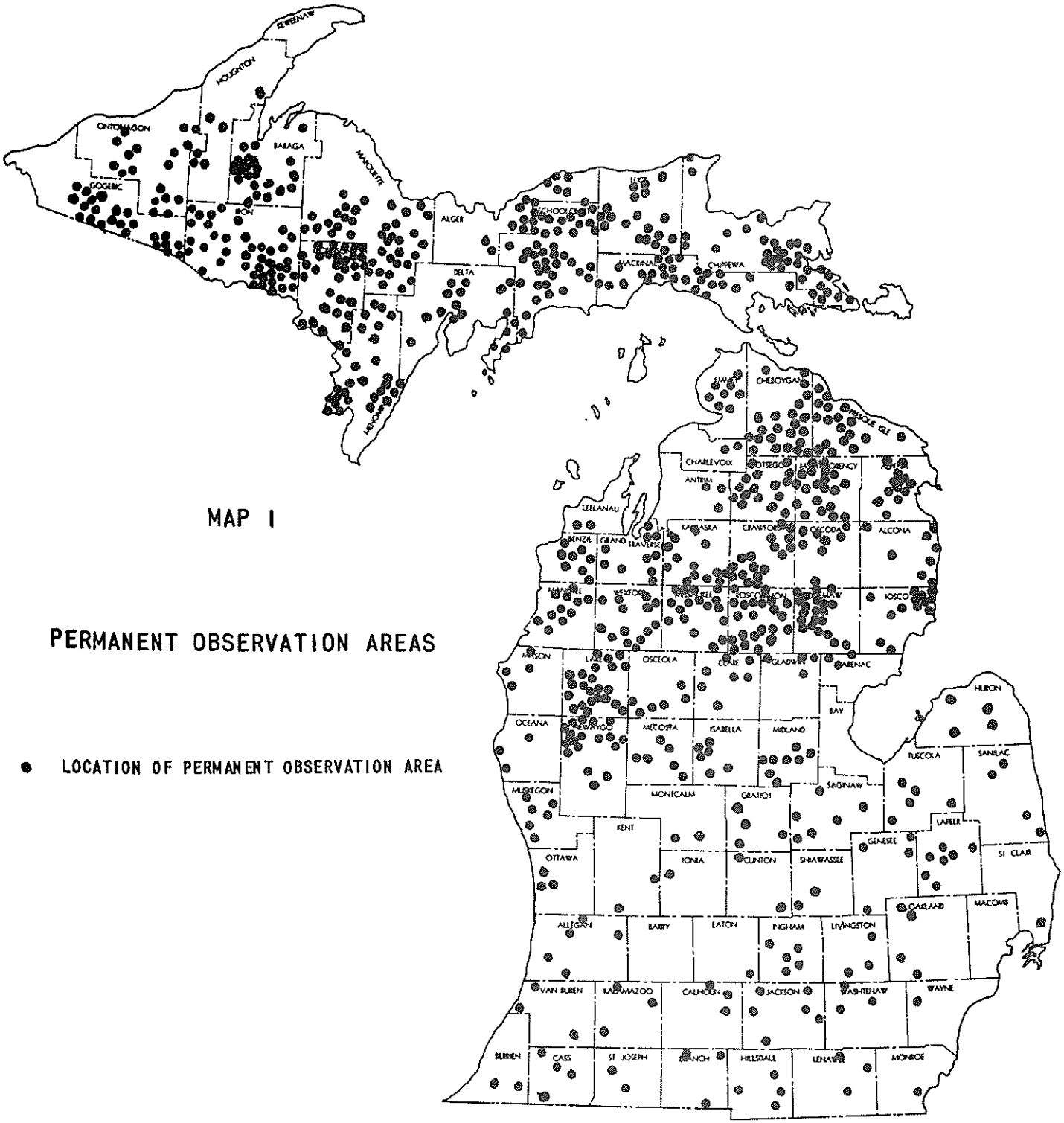
Cooperation with neighboring states in regional activities is an important part of the program. The twelfth annual Lake States Forest Insect Work Conference was held in Minneapolis in March with representatives of federal, state, and private agencies participating. The major problems confronting this group are the standardization and coordination of survey techniques and activities in Minnesota, Wisconsin, and Michigan, and the measurement of insect damage.

Close coordination between corresponding agencies in the Great Lakes region has been possible through the Central International Forest Insect and Disease Conference. At this annual conference, entomologists, pathologists, and foresters from the three Lake States and adjoining Canadian Provinces are able to discuss mutual forest pest problems and present research findings. The Michigan Conservation Department was host to the eleventh meeting of this conference held in September at Higgins Lake, Michigan.

On December 11, 1962, the annual meeting of the Michigan Forest Pest Detection Program committee was held in Lansing to review the work carried on during the year by the various agencies concerned with surveys, control and research, to discuss the annual report, and to make plans for 1963. Those in attendance were:

J. W. Butcher, Department of Entomology, M.S.U.
W. S. Cath, Michigan Department of Agriculture
J. B. Cody, Kimberly-Clark Corporation
T. E. Daw, Michigan Department of Conservation
A. C. Dowdy, Department of Entomology, M.S.U.
P. R. Flink, Michigan Department of Conservation
S. A. Graham, School of Natural Resources, U. of M.
F. B. Knight, School of Natural Resources, U. of M.
J. W. Leonard, Michigan Department of Conservation
W. E. Miller, U.S.F.S., Lower Peninsula Research Center
E. Millers, U.S.F.S., National Forests
A. F. Monroe, Soil Conservation Service
L. H. Moore, U.S.F.S., Regional Office
V. J. Rudolph, Forestry Department, M.S.U.
N. F. Smith, Michigan Department of Conservation
L. W. Wilson, U.S.F.S., Lower Peninsula Research Center
R. M. Wilson, Soil Conservation Service
W. J. Young, Michigan Department of Agriculture

The following report of activities of the Michigan Forest Pest Detection Program for 1962 was compiled by the Forestry Division of the Michigan Department of Conservation. Pest information for federal lands was obtained in part from the Lake States Forest Experiment Station and the U.S. Forest Service Report, "Annual Regional Report on Forest Insects and Disease Conditions - Region 9" for 1962.



MAP 1

PERMANENT OBSERVATION AREAS

● LOCATION OF PERMANENT OBSERVATION AREA

ORGANIZATION OF PROGRAM

The successful reduction in wood losses caused by forest fires by the use of organized detection and suppression methods, focused attention on other causes of wood losses and means of reducing them. Fire, the once great destroyer of forests, has been reduced to a subordinate position behind diseases and insects. However, it must be remembered that the great potential for destruction is still present and only through continued efforts can fire losses be kept at a minimum.

Disease and insects, although not as spectacular as fire, and needing different methods for detection and suppression, nevertheless destroy tremendous numbers of trees and forest products. With this thought in mind, a forest pest detection program was outlined and organized in 1950 by the Conservation Department with the cooperation of the U. S. Bureau of Entomology and Plant Quarantine (now the Division of Forest Insect Research, U. S. Forest Service); the U. S. Forest Service; the School of Natural Resources, University of Michigan; the Departments of Entomology, and Botany and Plant Pathology, and Forestry Extension Service, Michigan State University; and the Division of Plant Industry, State Department of Agriculture.

The objectives of the program are: (1) to detect the presence of forest insects and diseases, and to apprehend outbreaks by systematically and annually collecting records of occurrence and damage; (2) to facilitate and organize direct control in case of emergency; (3) to provide a basis for protective measures by indirect means; and (4) to provide forest land owners and managers, through the use of newspapers, reports and memoranda, up-to-date information on the status of the important forest pests.

The detection framework is built principally around the field organization of the Forestry Division of the Conservation Department, which handles state and private lands, and the U. S. Forest Service which handles federal lands. The general field plans for insects, insofar as the State Forest Division districts are concerned, calls for the establishment of permanent observation areas scattered throughout each forest district on both state and private lands in timber stands where critical insects exist or are likely to exist. (See Map I). The observation areas are permanent to the extent that the trees remain susceptible to the critical insects. After the trees on an area reach a size no longer seriously affected by certain critical insects, the observation area may be replaced by one with a younger, more susceptible forest stand. The observation area usually consists of all of the susceptible forest type on a 40 acre description and therefore may vary in size from a few acres to forty acres.

Observations are submitted on report forms annually to the Lansing office of the Forestry Division, indicating the degree of infestation, or the absence, of each of the critical insects on the designated observation areas. Those critical insects found only in the southern part of the state are not reported on in the northern regions, and vice versa. Thus, each district forester has only six or eight critical insects to observe.

However, foresters are requested to report the presence of any insect observed on the areas that might become important or that has not previously been found in their area.

The two educational institutions participate in training programs and act in an advisory capacity on insect and disease identification and control measures, as does also the Division of Forest Insect Research of the U. S. Forest Service.

The State Department of Agriculture, through its Division of Plant Industry, is directly concerned in the program by virtue of its statutory authority to establish quarantines, to enter on private lands for purposes of inspection, and, where necessary, to compel or provide for the control of serious insect pests and contagious plant diseases.

The disease phase of the program does not follow the same routine as applied to insects, since there are relatively few "critical" forest diseases requiring constant surveillance. Individual programs have been developed for the most important diseases with various state and federal agencies cooperating in survey and control work.

* * *

PROGRAM ACTIVITIES

INFORMATION RELEASES

No new pest information leaflets were issued in 1962 to add to the 20 issued from 1956 to 1958. Many requests continued to be received from cooperators, landowners, teachers and others for the separate leaflets and for "Michigan Forest Pests," which is the compilation of the separate leaflets.

Several special reports, in the form of general memoranda, were issued throughout the year whenever it was advisable to alert the cooperators to unusual conditions, new pests in their areas, time for control applications, results of control activities or other important information.

Suggested news releases were sent to the Department foresters for their use, saving them the time required to write such articles. The purpose of these news releases was to alert landowners to the potential pests, recommended control measures, and correct timing for control.

COOPERATIVE REPORTS

The Michigan Forest Pest Detection Program helps to provide information for other cooperative reports as follows:

Lake States Forest Pest Newsletter - A forest pest newsletter covering the current status of the important forest pests in the Lake States was initiated in 1960 by the Lake States Forest Experiment Station at St. Paul, Minnesota. The responsibility for preparation and distribution of this newsletter has been taken over by the Regional Office of the U. S. Forest Service. The purpose of the newsletter is to enable entomologists, foresters, and others concerned, to keep abreast of the current pest situation. A summary of the current situation in Michigan, from information gained through the Michigan Forest Pest Detection Program reports and surveys, is submitted for use in each issue.

Cooperative Economic Insect Report - Information on insect infestations and seasonal development is sent to the Department of Entomology, Michigan State University, where it is forwarded to the Plant Pest Control Division, Agricultural Service, U. S. Department of Agriculture, for inclusion in the Cooperative Economic Insect Report. This report is a weekly resume of important insects in the United States and includes a section on forest insects.

Annual Regional Report on Forest Insect and Disease Conditions - Region 9, U.S.F.S. - Annually the forest pest situation in the Lake States is summarized by th U. S. Forest Service Regional Office in Milwaukee, Wisconsin from information submitted by the states and also collected by the Forest Service. The forest insect situation in Michigan as reported in the annual report of the Pest Detection Program is forwarded to the Regional Office for inclusion in the Region 9 report.

Status Report on Forest Insect Conditions - The information compiled in the previously mentioned report by the U. S. Forest Service in Region 9 is included in the Status Report of the Forest Insect Conditions covering the United States and published annually by the Division of the Forest Insect Research, Forest Service, U. S. Department of Agriculture in Washington, D.C.

* * *

COOPERATORS' REPORTS

Cooperators aid in the detection program by reporting on insect conditions in areas not covered by state foresters, thus helping to present a better overall picture of the forest insect situation in the state.

The following cooperators submitted reports on observations during 1962:

Kimberly-Clark Corporation
Michigan State University
North American Timber Co., Packaging Corporation of America
Oliver Iron Mining Division, U. S. Steel Corporation
Plant Industry Division, Michigan Department of Agriculture
U. S. Forest Service
University of Michigan

* * *

OBSERVATION REPORTS

A total of 1,882 observation reports was received and analyzed by the Lansing office of the Forestry Division. Of this total 1,850 were on the critical insects, representing a decrease of 240 critical insect reports from those received in 1961. The decrease is due to the continued reshuffling of the observation areas and the discontinuance of reporting some insects on those areas not considered suitable. In addition, many new areas were established late in the 1962 season and some of the early insects were not reported.

Observation areas now total 824, with 677 checked by Conservation Department personnel, 81 by the U. S. Forest Service, and 23 by forest industry.

A major reorganization is expected in 1963 within the Conservation Department affecting many forest boundaries. It is expected that all observation areas will be again checked for suitability and coverage throughout the forested areas and observation locations dropped or added as the necessity arises.

* * *

CRITICAL INSECTS

The list of critical forest insects in Michigan has been changed from time to time to include actively or potentially injurious insects and to remove from the list those which are no longer considered thus.

The insects on the critical list are those on which regular observation area reports are submitted. During 1962, the following insects were on the critical insect list:

Insect	Area Reporting (1 Upper Peninsula, 2 Northern Lower Michigan, 3 Southern Lower Michigan)
European pine sawfly	3
European pine shoot moth	2,3
Forest tent caterpillar	1,2
Saratoga spittlebug	1,2
Anomala beetle	2
Jack pine budworm	1,2
Spruce budworm	1
Larch sawfly	1,2
White pine weevil	1,2,3
Red-headed pine sawfly *	1,2
Pine root collar weevil *	1,2,3
Zimmerman pine moth *	1,2,3

At the December 1962 meeting of the Michigan Forest Pest Detection Program Committee, it was recommended that some observation areas be established in hardwood stands to determine the insects present. These areas will not be for any specific insects at present. Following are reports of critical insects for 1962

* Reports on these insects were requested from a few districts in the state in an effort to determine the extent and severity of their damage. More complete reporting will be asked for in 1963.

JACK PINE BUDWORM - Choristoneura pinus Free.

Observation reports and surveys showed a sharp decrease in severity of jack pine budworm defoliation in Michigan in 1962. Only two observation areas were reported as heavily defoliated in 1962, compared to 12 areas in 1961. Infestations surveyed in 1961 in Grand Traverse and Baraga counties which were considered serious at that time greatly diminished in 1962. Some top killing, however, did occur in these areas.

Budworm populations are generally low throughout the state except for the Danaher Plains area of Luce County, north of Gwinn in Marquette County, and in Otsego County where the population is increasing.

In addition to the above areas, reports of heavy defoliation were received from Benzie, Grand Traverse, Chippewa and Alger counties. Moderate defoliation was reported in Lake and Chippewa counties. (See Map II)

Surveys and Control

Surveys following the 1961 defoliation showed two major areas of jack pine budworm infestation on state land: Approximately 4,121 acres in Baraga County and 3,685 acres in Grand Traverse County. Merchantable timber and young trees on these areas were of sufficient value to justify control action if the budworm populations continued at a high level in 1962.

These outbreaks were again surveyed in 1962 with the intention of initiating control action if the population held at the high level and the trees were in danger of being killed. Spring larval population surveys indicated , however, that the budworm populations had been reduced below the damaging level and control plans were canceled.

In Chippewa County, high populations continued, necessitating spraying of 12,500 acres on the Hiawatha National Forest by the U. S. Forest Service. Budworm populations were reduced by 99 percent as a result of the aerial application of DDT.

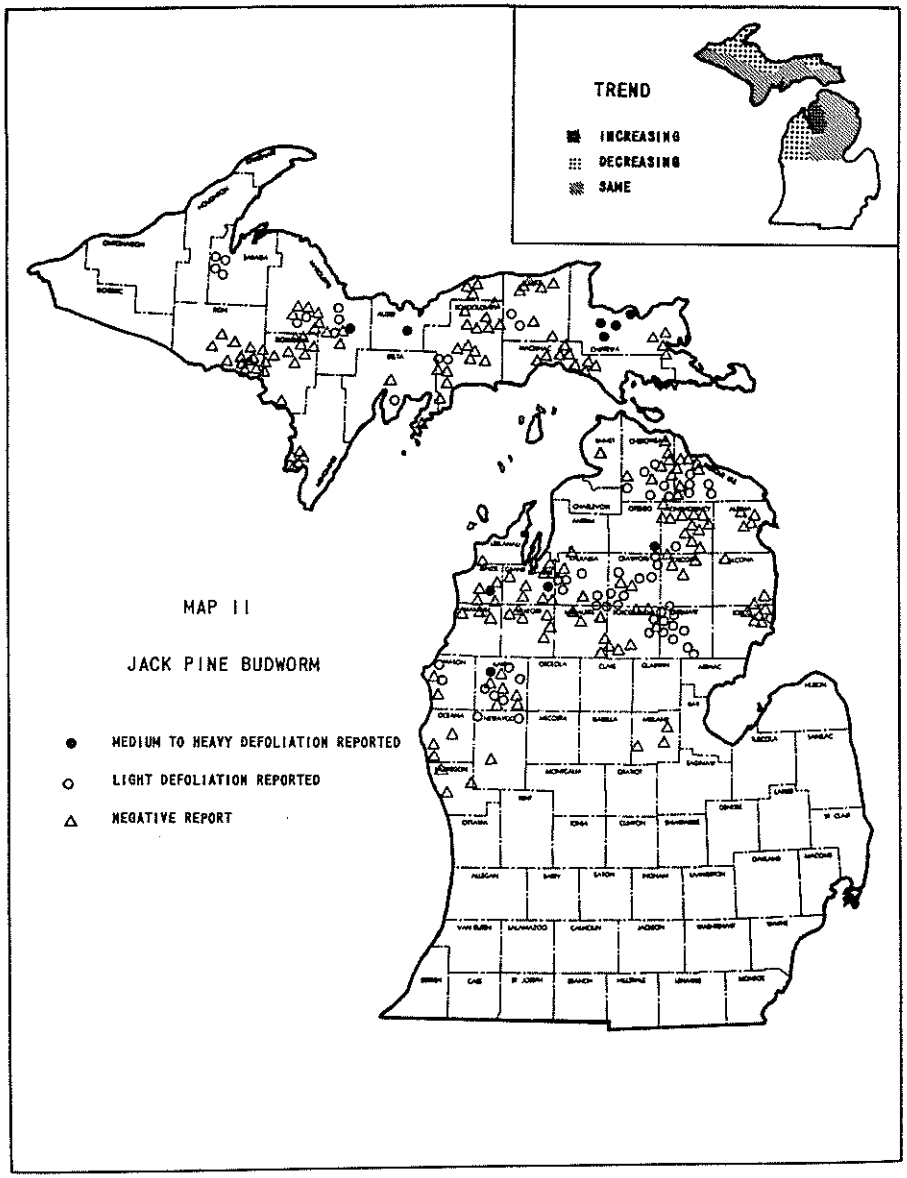
No control operations against the jack pine budworm are planned for 1963.

Summary of Reports

	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962
Total.....	135	185	232	280	291	276	267	269	246	244	301	247
% Positive....	38	40	32	20	20	29	22	19	14	11	28	28

Breakdown of 1962 Reports

Heavy defoliation (61-100%)..... 2.....(3%)
Medium defoliation (21-60%)..... 7.....(10%)
Light defoliation (1-20%).....59.....(87%)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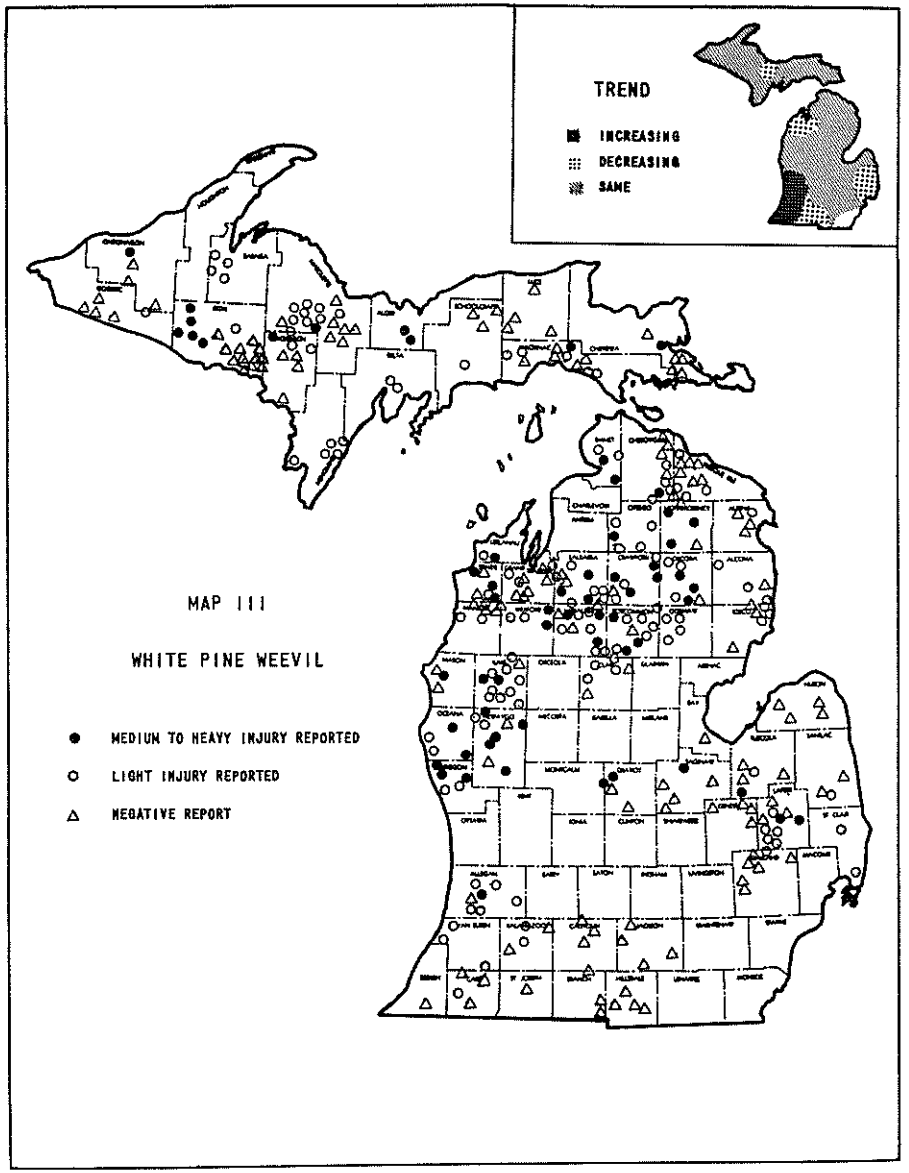
MAP II
JACK PINE BUDWORM
MEDIUM TO HEAVY DEFOLIATION REPORTED
LIGHT DEFOLIATION REPORTED
NEGATIVE REPORT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MAP III
WHITE PINE WEEVIL
MEDIUM TO HEAVY INJURY REPORTED
LIGHT INJURY REPORTED
NEGATIVE REPORT

WHITE PINE WEEVIL - Pissodes strobi (Peck)

After a slight reduction in the weevil population in 1961, apparently due to the cool spring, the general level of weevil damage rose again in 1962. The weevil is found throughout the state wherever white, Scotch or jack pine grows, except for the extreme southeastern section of the state.

The heaviest concentration of weevil damage is in the northern part of lower Michigan. This is also the area of heaviest concentration of pine plantations.

Infestations of over 40 percent of the trees were reported in Iron, Marquette, and Alger counties in the Upper Peninsula, and Emmet, Cheyboygan, Otsego, Mason, Oceana, Newaygo, Muskegon, Allegan, Saginaw and Tuscola counties in lower Michigan. (See Map III)

White pine weevil infestations on red pine are becoming more common and will contribute to deformities on this species.

It is expected that the weevil populations will continue at a high level in 1963.

Control

Control on state land using inmate labor with back pack sprayers has been very successful, reducing the weeviled tops to less than one-half of one percent of the trees. Jack pine on 84 acres in Manistee County and 136 acres in Grand Traverse County on the Fife Lake State Forest, and 243 acres in Otsego County on the Pigeon River State Forest were sprayed in April, 1962.

Plantations sprayed were generally about 3-4 feet in height and had about 15 percent of the trees weeviled the previous year. Approximately 4 man-hours of inmate labor were required to spray one acre. On days during the spray period in April, when weather conditions will not permit spraying, the misshapen and forked trees are clipped to restore them to a single stem. This is necessary where previous weeviling has caused multiple leadered trees, as each leader would not be adequately covered during the spraying with the insecticide.

Summary of Reports

	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962
Total.....	39	33	231	278	319	306	317	335	333	306	385	339
% Positive.....	82	64	65	59	60	53	56	62	58	62	59	56

Breakdown of 1962 Reports

Heavy injury (41-100% of leaders killed)..... 20.....(10%)
Medium injury (11-40% of leaders killed)..... 43.....(23%)
Light injury (1-10% of leaders killed).....126.....(67%)

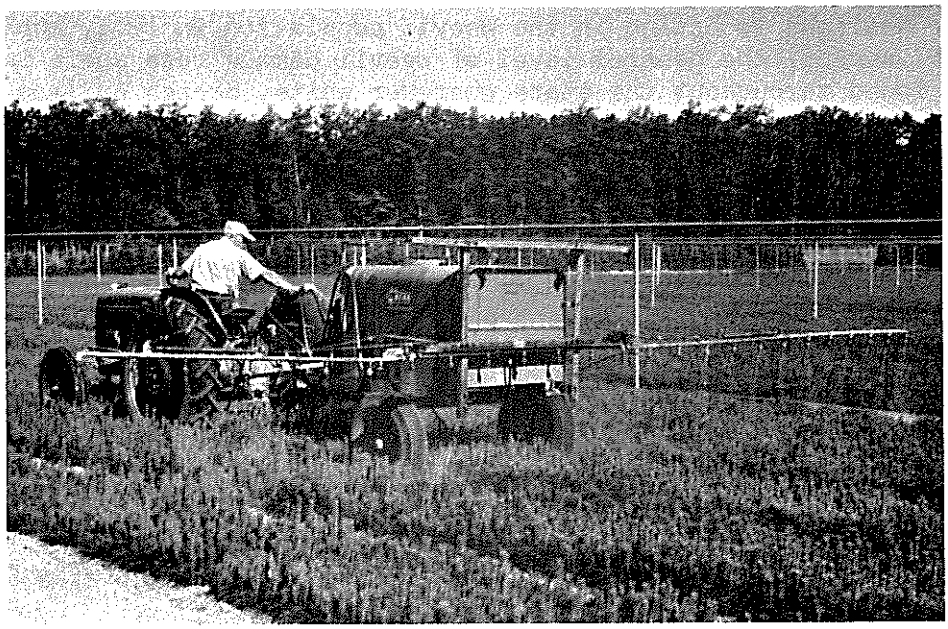


Fig. 1

Thorough spraying of nursery beds has controlled the European pine shoot moth in planting stock.

EUROPEAN PINE SHOOT MOTH - Rhyacionia buoliana (Shifff.)

European pine shoot moth populations were about the same in 1962 as in 1961. Previously the general population level declined in 1958 and 1959, slightly increased in 1960 and increased more sharply in 1961. Many trees were able to recover during the low period in 1958 and 1959, and even though they are still being attacked, they are outgrowing the damage.

Damage is most severe in the southern half of lower Michigan and northward in the counties nearest the Great Lakes. Elsewhere in north central lower Michigan and in some areas of the Upper Peninsula away from the Great Lakes, the shoot moth persists, but causes little damage.

Heavy damage was reported in most of the southern lower Michigan counties, and Mason and Wexford counties in the northern half. See Map IV.) The shoot moth is known to be present in Chippewa, Luce, Mackinac, Schoolcraft, Delta, and Houghton counties in the Upper Peninsula.

The shoot moth is expected to continue damaging pine in the warmer sections of Michigan, particularly on the poorer soils.

Control

Control operations on state land have been limited to spraying in the nurseries to prevent shipment of infested stock. (See Fig. 1)

EUROPEAN PINE SHOOT MOTH (Cont'd.)

Summary of Reports

	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962
Total.....	44	80	119*	203	207	258	242	229	225	238	269	249
% Positive....	80	40	47	39	49	42	48	51	52	44	48	52

*Increase due to inclusion of insect on critical list of districts in northern half of lower peninsula.

Breakdown of 1962 Reports

Heavy injury* .....26.....(20%)
Medium injury* ..... 8.....(6%)
Light injury* .....96.....(74%)

*Degree of injury = "I" = $\frac{\text{\% of susceptible trees attacked x \% of tips infested}}{100}$

Heavy if "I" is greater than 20
Medium if "I" is between 10 and 20
Light if "I" is less than 10

RED-HEADED PINE SAWFLY - Neodiprion lecontei (Fitch)

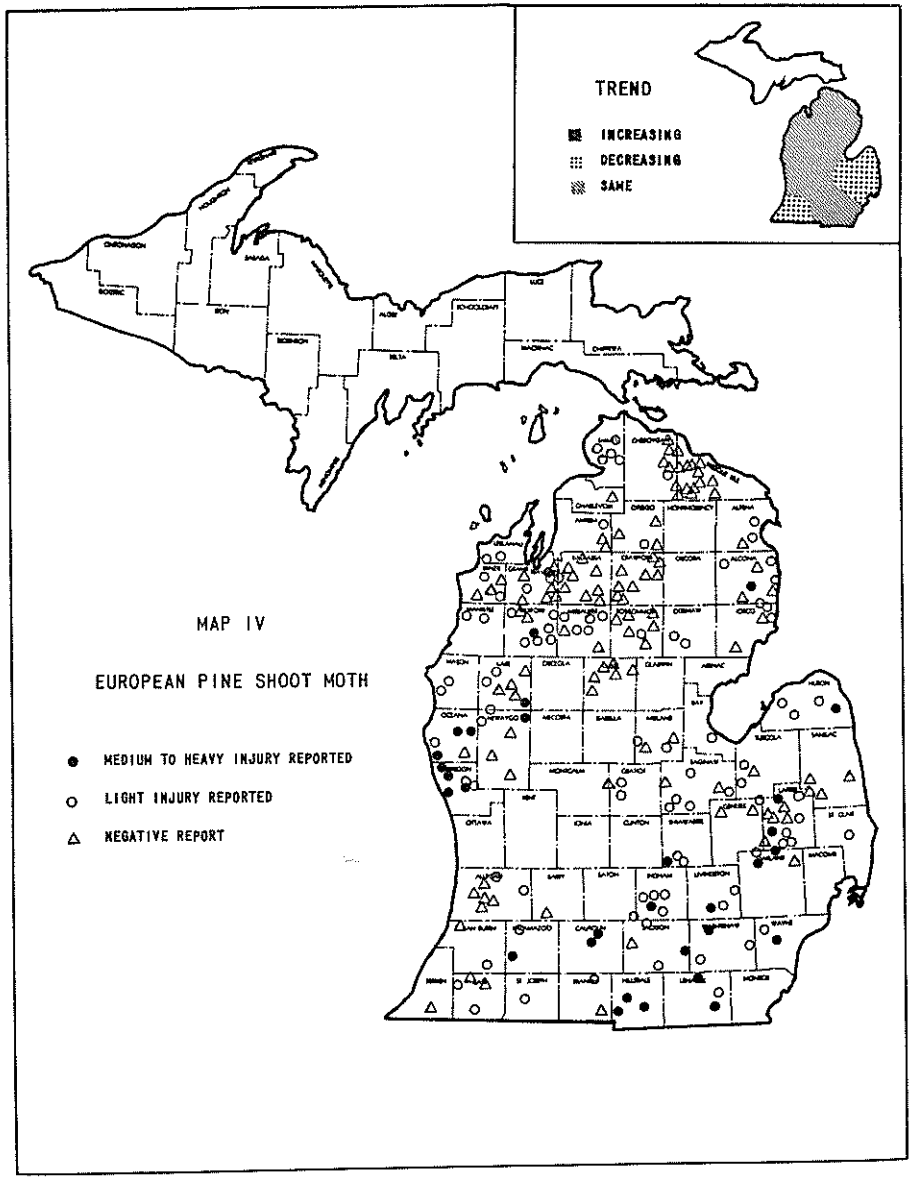
Following the sudden collapse in the red-headed pine sawfly population in northwestern lower Michigan in 1961, the populations remained at a low level in 1962. This insect has been cyclic in the past with recent serious outbreaks occurring in the mid-1930's and mid-1940's. It is in the downward part of its cycle at present. Future outbreaks are going to be more difficult to detect and control because of the nature of the recent plantations which are generally smaller, more isolated spots of odd shapes compared to earlier plantings of large, open areas.

Light injury was reported from Mackinac, Otsego, Grand Traverse, Leelanau, and Benzie counties. Reports from Montmorency County indicated moderate injury. (See Map V)

It is expected that the red-headed pine sawfly will remain at a low level in 1963.

Control

A survey was made in Emmet County in red and jack pine plantations found in late 1961 to have been infested with the red-headed pine sawfly. With the exception of 180 acres of red and jack pine west of Carp Lake, the sawfly population had dropped below the economic level. Aerial application of DDT


TREND
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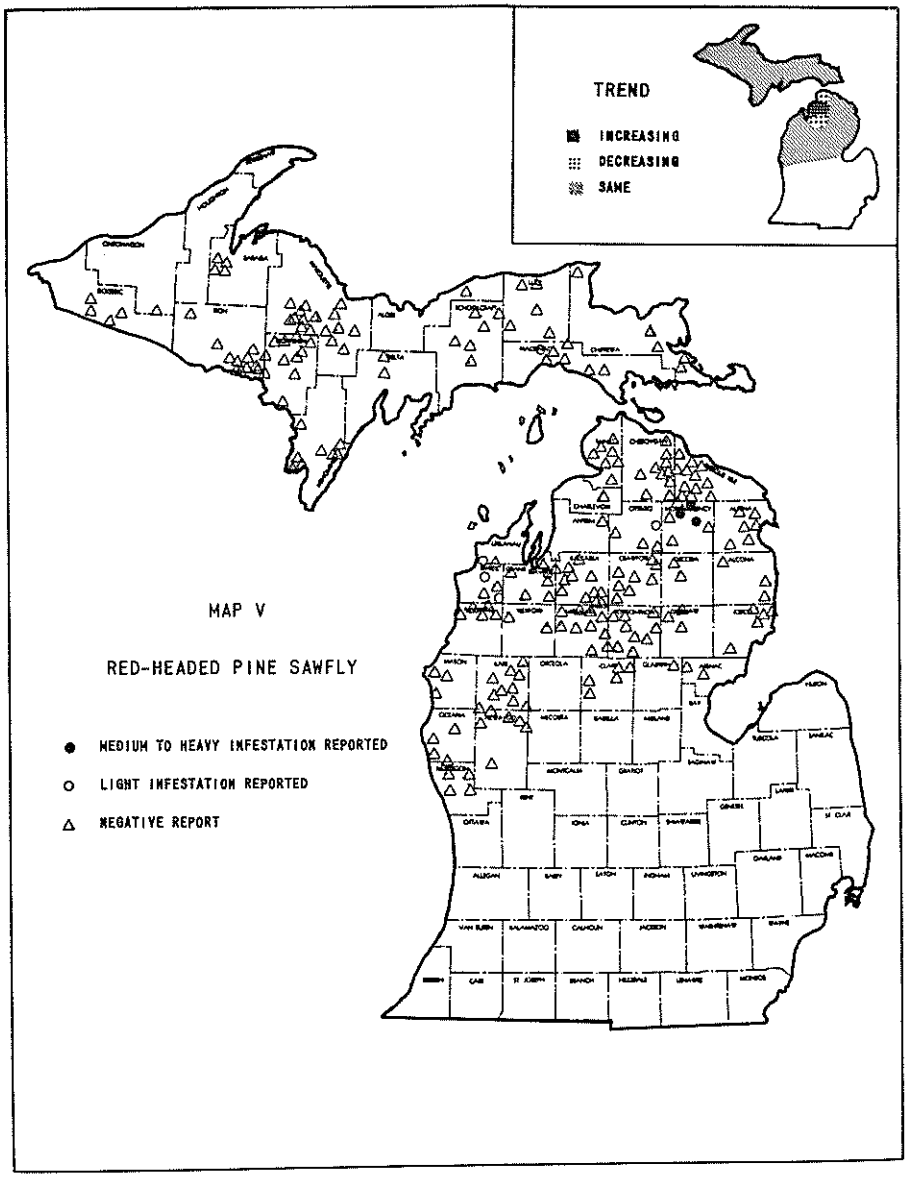
MAP IV
EUROPEAN PINE SHOOT MOTH
MEDIUM TO HEAVY INJURY REPORTED
LIGHT INJURY REPORTED
NEGATIVE REPORT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MAP V
RED-HEADED PINE SAWFLY
MEDIUM TO HEAVY INFESTATION REPORTED
LIGHT INFESTATION REPORTED
NEGATIVE REPORT

was used to control the sawflies on the 180 acres. No live larvae were found after the spraying.

No spraying is being planned for the sawfly in 1963.

Summary of Reports - Red-headed pine sawfly

	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962
Total.....	133	173	231	230	260	255	239	249	233	248	284	258
% Positive....	18	7	8	8	5	5	16	14	18	9	7	3

Breakdown of 1962 Reports

Heavy defoliation (11-100% susceptible trees attacked).....0....(0%)
Medium defoliation (2-10% susceptible trees attacked).....3....(33%)
Light defoliation (0-1% susceptible trees attacked).....6....(67%)

SARATOGA SPITTLEBUG - Aphrophora saratogensis (Fitch)

Saratoga spittlebug populations declined in 1962, as many reports indicated fewer spittle masses on sweet fern. However, serious damage did occur in some plantations, particularly in northern lower Michigan. Moderate damage was reported on observation areas in Delta County in the Upper Peninsula and Crawford County in lower Michigan. Light infestations were reported in most counties where plantations occur that contain an abundance of sweet fern with the pine. (See Map VI.)

Surveys and Control

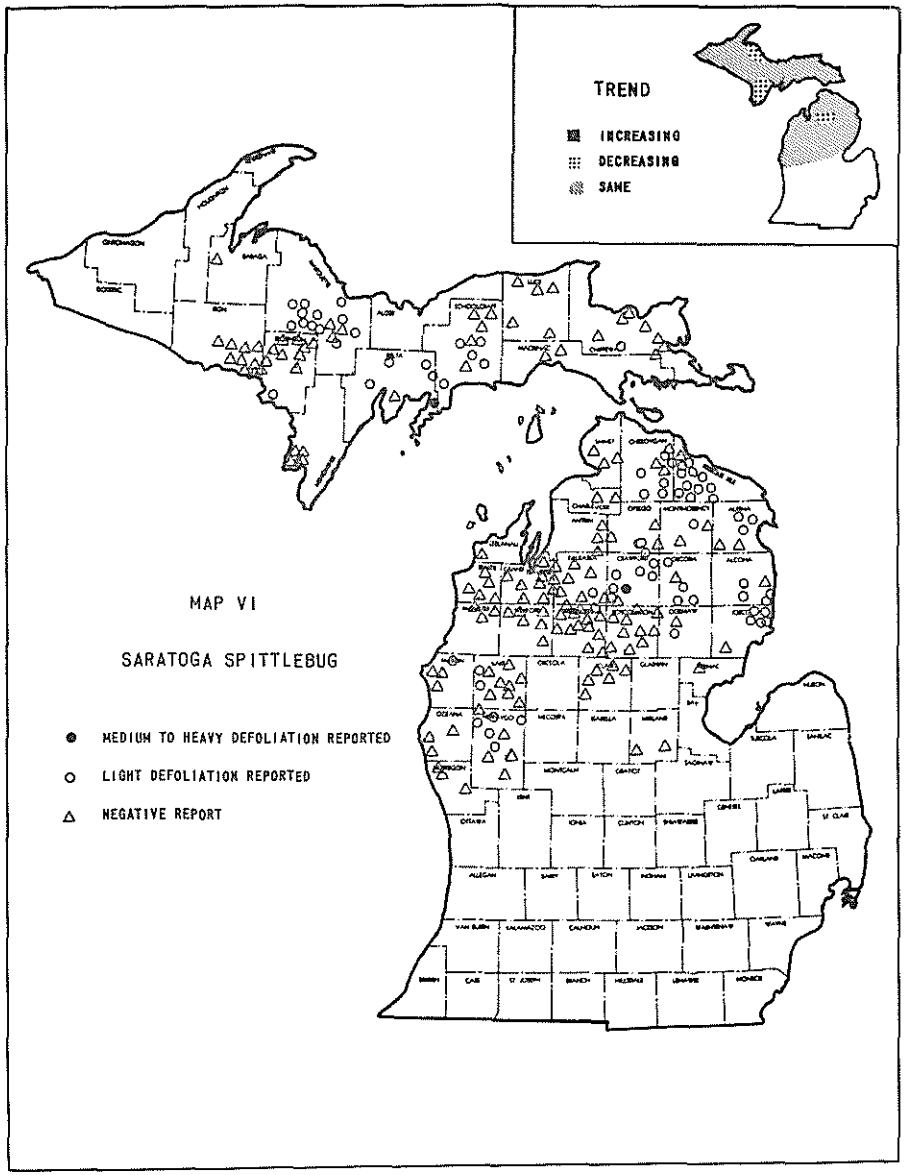
Surveys by the U. S. Forest Service indicated the necessity of control to prevent serious damage to a small area of red pine plantations on the Lower Michigan National Forest. DDT was aerially applied to 680 acres on the Harrisville District with excellent results.

Summary of Reports

	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962
Total.....	17	51	164	211	229	225	214	240	221	227	268	236
% Positive....	88	27	34	23	28	27	30	32	42	34	36	33

Breakdown of 1962 Reports

Heavy injury (61-100%)..... 0.....(0%)
Medium injury (21-60%)..... 2.....(2%)
Light injury (1-20%).....77.....(98%)


TREND
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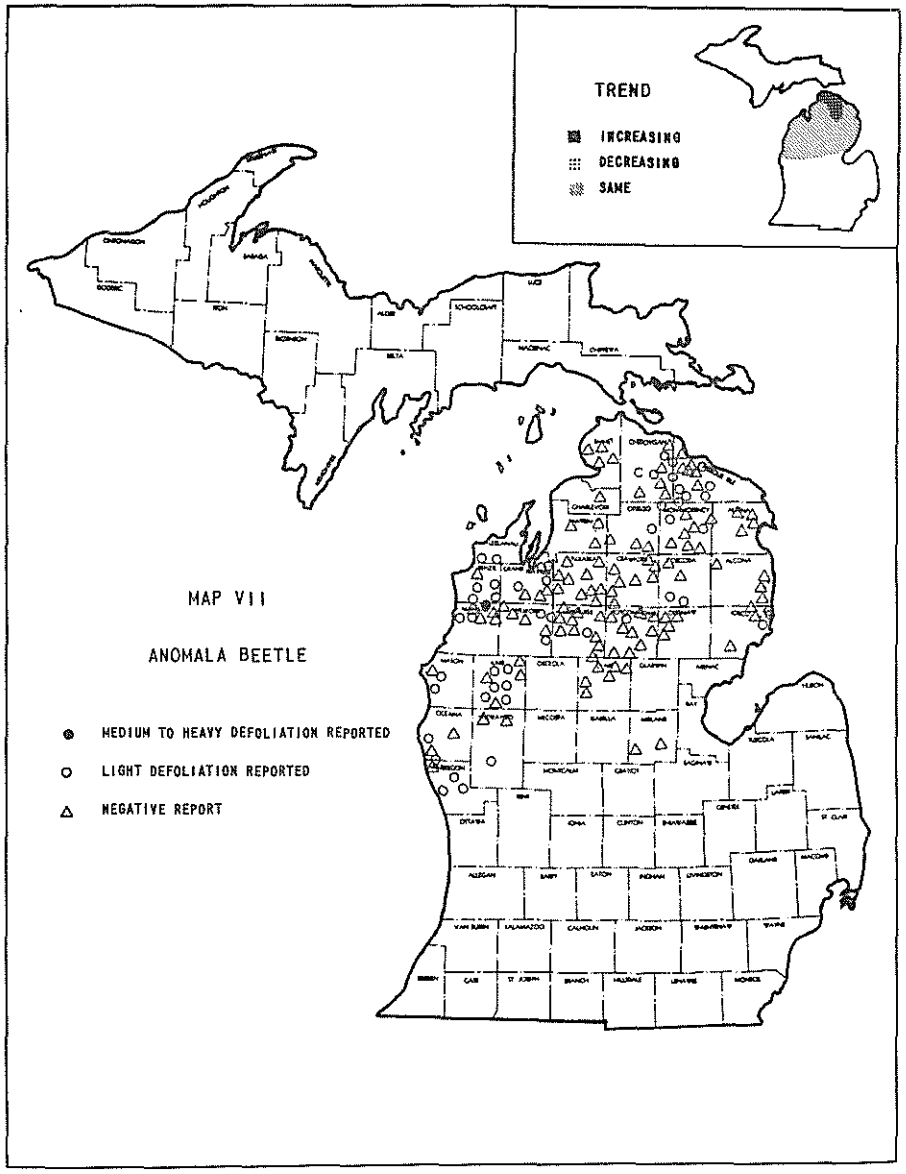
MAP VI
SARATOGA SPITTLEBUG
MEDIUM TO HEAVY DEFOLIATION REPORTED
LIGHT DEFOLIATION REPORTED
NEGATIVE REPORT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MAP VII
ANOMALA BEETLE
MEDIUM TO HEAVY DEFOLIATION REPORTED
LIGHT DEFOLIATION REPORTED
NEGATIVE REPORT

ANOMALA BEETLE - Anomala oblivia Horn

Anomala beetle infestations in northwestern lower Michigan were spotty with some plantations heavily defoliated and others with no apparent damage. In general, the populations were about the same as in 1961. The major exception was in northern Montmorency County where jack pine was heavily defoliated.

Reports from observation areas in Benzie County indicated defoliation over 20 percent. (See Map VII)

Summary of Reports

	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962
Total.....	119	181	236	278	275	271	269	243	239	140	203	178
% Positive....	35	36	32	38	38	37	22	14	14	29*	28	31

*The apparent increase in percent of positive reports is due the dropping of observations for this insect in the U.P. where it has never been found.

Breakdown of 1962 Reports

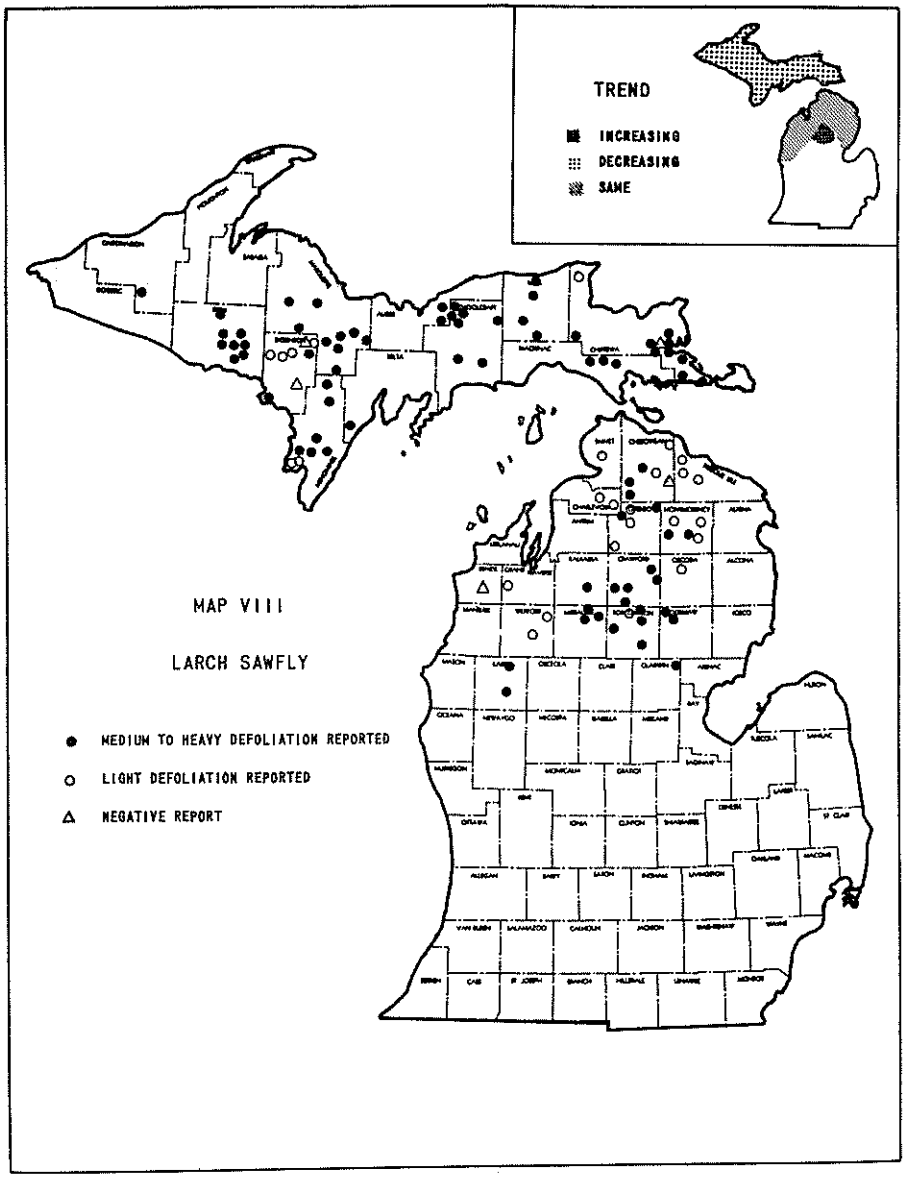
Heavy defoliation (61-100%)..... 0.....(0%)
Medium defoliation (21-60%)..... 1.....(2%)
Light defoliation (1-20%).....55.....(98%)

LARCH SAWFLY - Pristiphora erichsonii (Htg.)

Larch sawfly populations were down considerably in 1962. Following a high in the current outbreak in 1959, the populations declined in 1960, rose slightly in 1961 and again declined in 1962. This is evident in the reports of heavy defoliation that were received during these years. In 1959, 60 percent of the positive reports indicated heavy defoliation. A drop to 34 percent occurred in 1960, followed by an increase to 39 percent in 1961 and a greater drop to 21 percent in 1962. This is the lowest percent of heavily defoliated areas reported since 1956.

The populations vary greatly from stand to stand with some stands showing complete defoliation, while nearby stands are only lightly defoliated. Reports were received of top killing and tree mortality. Generally, however, the stands are continuing to survive, although in a weakened condition with slower growth.

Only five negative reports were received for the larch sawfly, two in Dickinson County, and one each in Chippewa, Cheboygan and Benzie counties. (See Map VIII.)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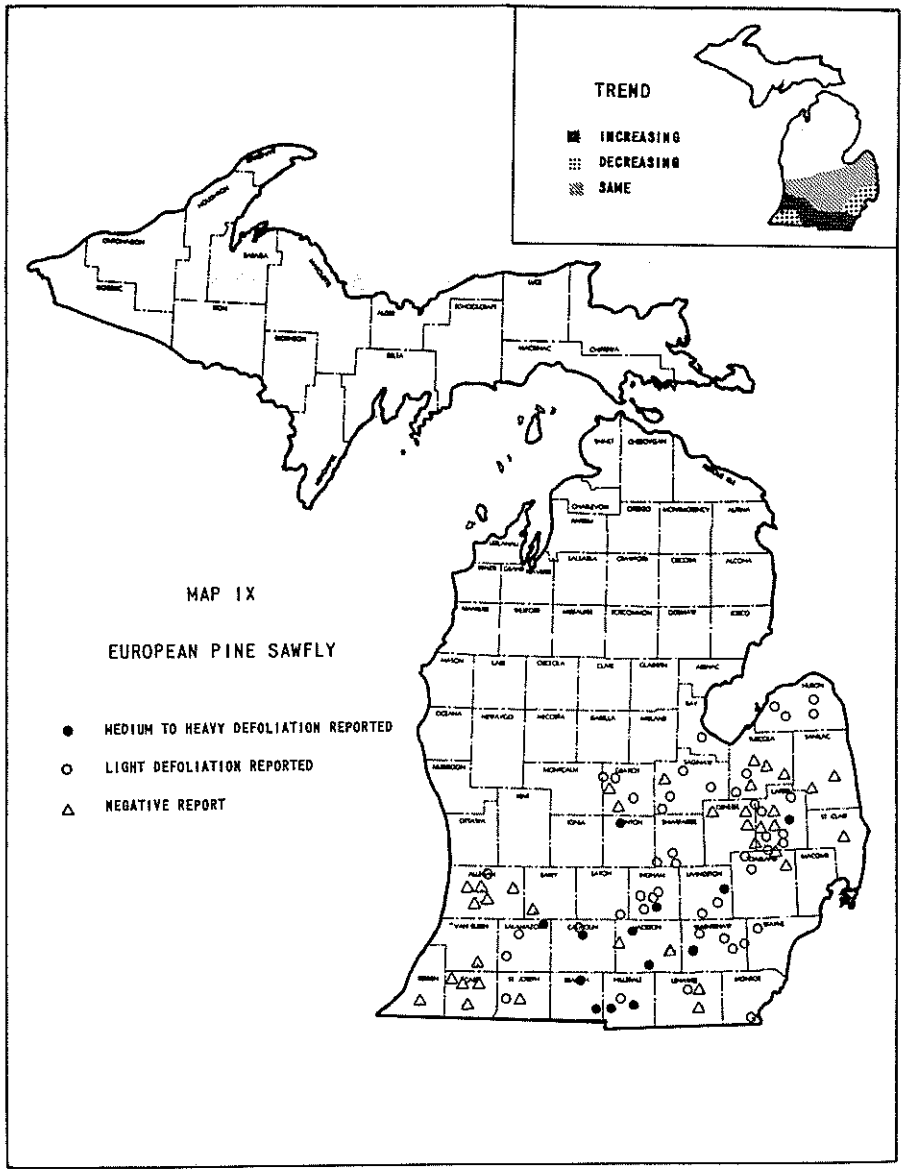
MAP VIII
LARCH SAWFLY
MEDIUM TO HEAVY DEFOLIATION REPORTED
LIGHT DEFOLIATION REPORTED
NEGATIVE REPORT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MAP IX
EUROPEAN PINE SAWFLY
MEDIUM TO HEAVY DEFOLIATION REPORTED
LIGHT DEFOLIATION REPORTED
NEGATIVE REPORT

LARCH SAWFLY -(Cont'd.)

Summary of Reports

	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962
Total.....	68	113	137	135	145	140	133	131	118	116	130	119
% Positive....	0	30*	42	73*	66	81	85	95	97	99	99	96

*The apparent increase is largely due to intensified surveys rather than build-up of insect populations.

Breakdown of 1962 Reports

Heavy defoliation (61-100%).....24.....(21%)
Medium defoliation (21-60%).....64.....(56%)
Light defoliation (1-20%).....26.....(23%)

EUROPEAN PINE SAWFLY - Neodiprion sertifer (Geoff.)

European pine sawfly populations continued to increase in the southern part of lower Michigan, resulting in two years of heavier defoliation than has occurred in recent years.

Heavy defoliation was reported in Livingston, Washtenaw, Kalamazoo, Calhoun, Jackson, Branch and Hillsdale counties in southern lower Michigan. (See Map IX.) This sawfly has been recorded as being present in the northern part of lower Michigan, but no areas of infestation have been reported in recent years.

Many of the plantations in the southern portion of lower Michigan are sprayed with insecticides, thereby helping to keep this sawfly from causing more serious defoliation.

In 1961, a virus disease of the sawfly was sprayed in several plantations. Very little carry-over of the virus was observed in 1962. These areas will continue to be observed in 1963 and new areas sprayed with the virus.

Summary of Reports

	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962
Total.....	31	64	85	82	111	100	104	91	97	89	96	87
% Positive....	87	69	74	75	74	62	56	59	48	57	61	67

EUROPEAN PINE SAWFLY - (Cont'd.)

Breakdown of 1962 Reports

Heavy defoliation*..... 8.....(14%)
Medium defoliation*..... 5.....(9%)
Light defoliation*.....45.....(77%)

*Degree of defoliation = "D" =

$$\frac{\%\text{ of susceptible trees attacked} \times \%\text{ of defoliation}}{100}$$

Heavy if "D" is greater than 24
Medium if "D" is between 9 and 24
Light if "D" is less than 9

FOREST TENT CATERPILLAR - Malacosoma disstria Hbn.

Forest tent caterpillars were found in most aspen and maple stands in northern lower Michigan, although general defoliation was not yet apparent. Full-grown caterpillars were also observed on roads. These indications point to the beginning of another outbreak in northern Michigan.

During the previous large outbreak in the early 1950's, aspen was the primary host in Michigan. However, in other parts of the country, maple was the principal host. The next outbreak in Michigan will probably occur on aspen and maple as indicated by the common occurrence of the caterpillars in stands of both species at present. (See Fig. 2)

Light defoliation was reported on observations made in Emmet, Antrim, and Montmorency counties.

Aspen leaf rollers were also present in many stands in northern lower Michigan in May and it was impossible, therefore, to correctly assess the defoliation caused by the forest tent caterpillar alone. At least three species of leaf rollers were involved: Large aspen tortrix, Archips conflictana (Wlkr.), Epinotia nisella creddleana (Kearf.), and Anacampsis innocuella Zell.

No control is planned for the forest tent caterpillar in 1963. However, extensive surveys may be made in the fall to predict the 1964 populations if an outbreak appears imminent.

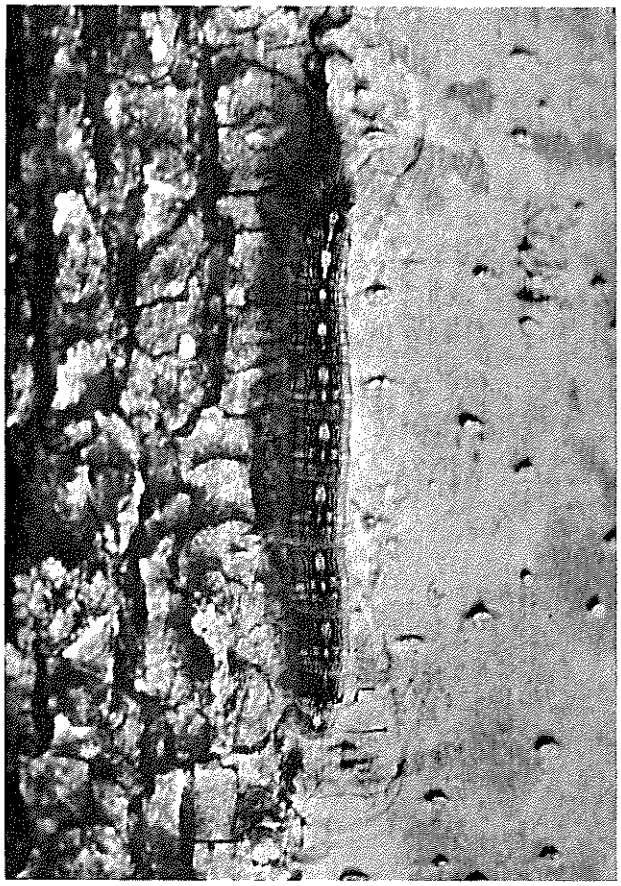


Fig. 2

Forest tent caterpillars are becoming more numerous and are found on maple as well as aspen trees.

Summary of Reports - Forest Tent Caterpillar

	1954	1955	1956	1957	1958	1959	1960	1961	1962
Total.....	117	120	111	114	109	119	113	130	109
% Positive....	23	17	5	4	0	3	3	2	5

Breakdown of 1962 Reports

Heavy defoliation (61-100%).....0.....(0%)
Medium defoliation (21-60%).....0.....(0%)
Light defoliation (1-20%.....5.....(100%)

SPRUCE BUDWORM - Choristoneura fumiferana (Clem.)

Spruce budworm continued at the same endemic levels with no areas of outbreaks reported in Michigan. Budworm caterpillars could be found in many spruce-fir stands but no noticeable defoliation was reported.

Summary of Reports

	1956	1957	1958	1959	1960	1961	1962
Total.....	40	29	30	25	30	24	21
% Positive....	2	3	3	0	0	0	0

Breakdown of 1962 Reports

Heavy defoliation (61-100%).....0.....(0%)
Medium defoliation (21-60%).....0.....(0%)
Light defoliation (1-20%).....0.....(0%)

* * *

OTHER IMPORTANT INSECTS

PINE ROOT COLLAR WEEVIL - Hylobius radicis Buch.

Trees killed by the pine root collar weevil continue to show up in new locations, and in increasing numbers. Damage has been particularly serious on the western side of lower Michigan, with tree mortality occurring in plantations as young as six years old and as old as thirty years. Serious damage is generally confined to edges of openings in the older plantings or in poorly stocked stands. Even within a plantation, dead trees are not found in the densely stocked portion, while sparse areas have dead and windthrown trees.

Two dead trees were found in a red pine plantation established in 1956 in Kalkaska County. This is the youngest plantation with tree mortality due to the root collar weevil found to date. Many other trees within the same plantation showed shortened growth or discoloration due to weevil attack, and will probably soon die.

The pine root collar weevil may become the most important insect pest of young plantations due to the difficulty in detecting incipient infestations and the present lack of any economical control method.

ZIMMERMAN PINE MOTH - Dioryctria zimmermani (Grote)

Damage caused by the Zimmerman pine moth can be found throughout the state, but in most cases is insignificant. Larvae, or their borings, are common in the woody galls on jack pine, caused by the pine-oak or eastern gall rust. In general, however, on jack pine, the larvae confine their feeding to the galls and are, therefore, unimportant.

When the Zimmerman pine moth larvae attack Scotch pine, two distinct, different types of feeding occur. The cambial region is mined, and the center of the new growth is mined. The first type of feeding may result in branch killing or complete tree mortality. The latter type of damage kills the outer portion of the new growth and is less important, as much of the new growth is often removed during shearing operations in Christmas tree plantations. Ottawa and Allegan counties are the most heavily damaged areas, with surrounding counties also with high populations.

WHITE GRUBS - Phyllophaga Spp.

The most important insect pest of very young plantations is the white grub. Small roots are eaten and the bark is chewed off of larger roots, killing recently planted trees. (See Fig. 3.) While damage is the most severe during the first year, additional mortality occurs for at least the first four growing seasons.

The most severe case of white grub damage found in 1962 was on the Goose Lake sand plains in Marquette County, where over 90% of the fall 1961 planting on 40 acres was killed. In other places grub loss reduced the stocking of the pine below the minimum acceptable level.

Preplanting surveys have not been reliable in predicting losses due to grubs. Therefore, in areas where grub losses have occurred in the pst, all trees planted on state land are now treated prior to, or during, the planting operation. This is accomplished by spraying the roots and soil with an aldrin solution from a sprayer attached to the planting machine, or by dipping the roots in an aldrin solution prior to hand planting.

During 1962, 4,491,000 trees planted on 5,456 acres of state land, were treated to prevent grub damage. The following acreages were treated:

Planting using machine mounted sprayer

Lake Superior State Forest	855	Acres
Grand Sable State Forest	2,317	"
Fife Lake State Forest	34	"
Pigeon River State Forest	793	"
Mackinac State Forest	486	"

Planting with roots dipped in aldrin

Fife Lake State Forest	158	Acres
Pigeon River State Forest	416	"
Michigamme State Forest	270	"
Manistique R. State Forest	127	"

It is more desirable to spray the roots than to dip them, as spraying places the aldrin on the roots and in the soil and thus protects the roots for at least four growing seasons. Dipping probably affords little protection after the first season. Dipping is used as an emergency measure when sprayers are not available and a grub infestation is found during the planting operation. Surveys prior to planting have not proven reliable and, therefore, all trees planted in areas of known grub infestations are treated.

In general, results of the treatment have been very successful, with only about one to three percent of the treated seedlings being killed the first season, as compared to 20 to 35% or more of untreated check trees.

Fig. 3

White grubs kill seedlings by eating the fine roots and chewing the bark on the larger ones.

ASPEN LEAF ROLLERS

Several aspen leaf rollers combined to defoliate aspen in northern lower Michigan, from Gladwin County northward. Anacampsis innocuella, Epinotia nisella creddleana, and the large aspen tortrix, Archips conflictana, were often present in the same stands. Heavy defoliation occurred in Gladwin, Ogemaw, Roscommon, Crawford, Oscoda, Montmorency, Otsego and Presque Isle

counties. Due to the presence of several species, it was impossible to assess the defoliation of any one of the leaf rollers. In addition, forest tent caterpillars were present in many of the stands and contributed to the defoliation.

JACK PINE SHOOT BORER - Eucosma sonomana Kearf.

Although found in Michigan in 1961, the jack pine shoot borer is mentioned in this report for the first time. It is known to be present in Gogebic, Ontonagon, Iron, Dickinson and Delta counties in the Upper Peninsula. In addition, jack pines apparently damaged by the shoot borer, have been found in two locations in Crawford County in lower Michigan. This pest bores into the center of the leader and terminals of the current year's growth and girdles them from the inside. The ends of the terminals and leaders fall over, leaving a three to four inch stub. This results in tree deformity similar to that caused by the white pine weevil.

EASTERN TENT CATERPILLAR - Malacosoma americana (F.)

Eastern tent caterpillars were extremely abundant in northwestern lower Michigan for the second consecutive year. Cherry trees up to 40 feet in height were completely defoliated and the tree trunks were covered with webbing. (See Fig. 4) Tents and caterpillars were found on aspen and other species of trees that are not normally eaten. Some branch mortality is beginning to show up in the cherry trees as a result of the defoliation.

PINE TORTOISE SCALE - Toumeyella numismaticum (P. & McD.)

Small isolated infestations of the pine toroise scale can be found in many parts of the state. These are usually confined to a few trees and in most cases the spread is not noticeable. A more serious outbreak has occurred for several years on the Stonington Peninsula of Delta County in the Upper Peninsula, where mature jack pine are being killed. Where the value of the timber warrants, salvage operations are being conducted by the U. S. Forest Service.

BALSAM FIR SAWFLY - Neodiprion abietis (Harr.)

Balsam fir, along U.S. 2 from Naubinway to Epoufette in Mackinac County, continues to be defoliated by the balsam fir sawfly. This sawfly is present in many other parts of the state, but this location is the only presently known area of obvious defoliation.

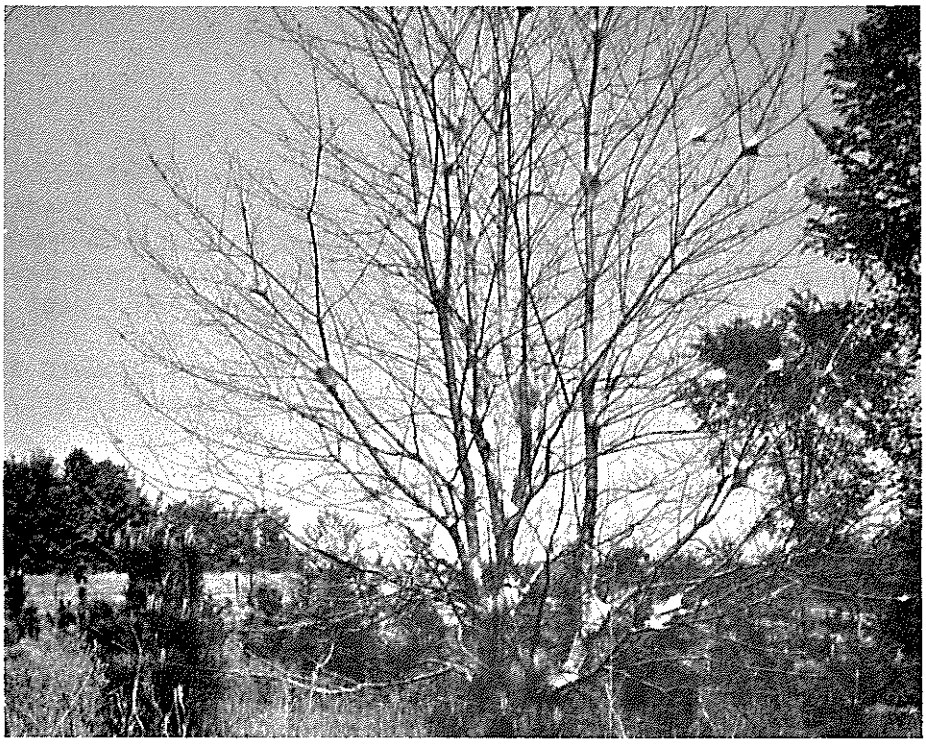


Fig. 4

Eastern tent caterpillars were numerous enough to completely defoliate many wild cherry trees.

A PINE TIP MOTH- Rhyacionia adana Hein.

Rhyacionia adana is generally distributed throughout most of northern lower Michigan and the Upper Peninsula and can be found in most red pine plantations that are under three feet in height. Fortunately, the tip killing is confined to young trees so that as the trees reach about three feet in height, serious damage ceases. Forking and loss of height growth are the result of the insect's activity.

WALKINGSTICK - Diapheromera femorata (Say)

The area of walkingstick defoliation in Ogemaw County continued to decline, being much less than 1960 and earlier years. Medium to heavy defoliation was apparent on 800 acres, four miles west of West Branch, and 400 acres, eight miles north of West Branch. About 13,000 acres were defoliated in 1960. The eggs of the walkingstick require two years to hatch and defoliation is noticeable only during the even-numbered years in the outbreak areas in Michigan.

The outbreak in Dickinson County in the Upper Peninsula covered approximately 800 acres, or about the same area as in 1960. A smaller defoliated area of five acres was reported on the East Tawas Ranger District by the U.S. Forest Service.

GYPSY MOTH - Porthetria dispar (L.)

The following information on the gypsy moth was received from the Division of Plant Industry, Michigan Department of Agriculture, and is a summary of their work on the gypsy moth during 1960.

> "Two male moths were trapped within one-half mile of each other in Onondaga Township, Ingham County, during the summer of 1961. These two locations were treated in May of 1962 with DDT and Sevin, applied with aircraft at the rate of one gallon to the acre. The trapping program which followed revealed no new infestations and the intent is to continue the trapping phase of this program for at least two more seasons."

* * *

DISEASES

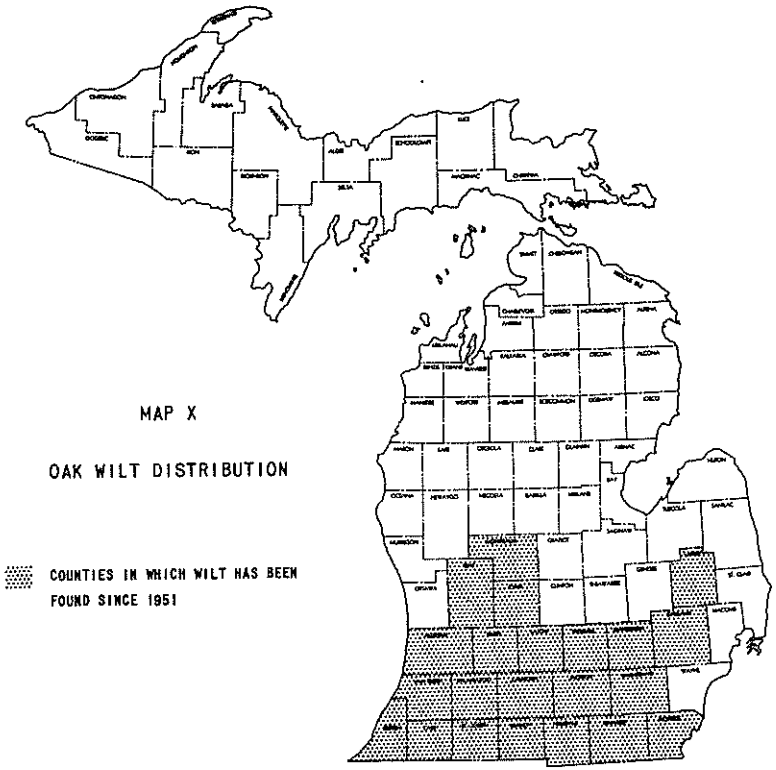
OAK WILT

The following information on the oak wilt situation in Michigan is a summary of the 1962 Oak Wilt Disease Control report prepared by the Division of Plant Industry, Michigan Department of Agriculture.

In 1962, the sixth year of the oak wilt control program, 16 active wilt locations were found. This represents a drop in locations of 89 percent since the program's beginning. The number of oak wilt infected trees has likewise dropped, with 82 percent fewer oak wilt trees found in 1962 than in 1956 when the control program began. These figures are somewhat misleading because all counties in which oak wilt has been found are not surveyed annually, but the principal infection areas surveyed annually have shown steady decline.

Comparisons of the four counties which have had continuous aerial survey and treatment during the six years of the program show that the number of active locations has been reduced 81 percent, and the number of infected trees has been reduced 77 percent. These figures indicate that the control effort is effective.

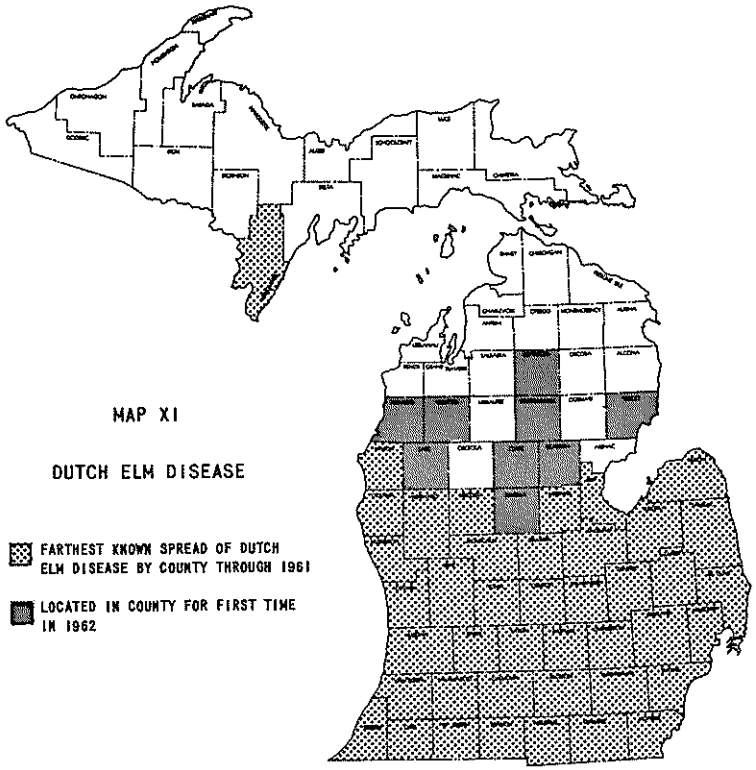
Surveys of other counties have been curtailed because of limited funds, and increasing amounts of oak wilt may be building up in these counties and could nullify the gains in controlling the disease in the surveyed counties. (See Map X.)



MAP X

OAK WILT DISTRIBUTION

COUNTIES IN WHICH WILT HAS BEEN FOUND SINCE 1951



MAP XI

DUTCH ELM DISEASE

FARTHEST KNOWN SPREAD OF DUTCH ELM DISEASE BY COUNTY THROUGH 1961

LOCATED IN COUNTY FOR FIRST TIME IN 1962

The control program consists of locating possible suspect trees by airplane. These suspect trees are then visited by ground crews who determine if they are infected. Infected trees are killed with a 2,4D ester, and all similar type oaks within a 50 foot radius are also treated in this manner to break one of the main avenues of spread through connected or grafted roots.

DUTCH ELM DISEASE

The Michigan Department of Agriculture coordinates a cooperative program of survey and control, working with the local units of government. The Plant Industry Division provides assistance to the municipalities in surveying for diseased, dead and dying elm trees and piles of elm wood in control areas; issues and enforces condemnation orders for the destruction of such sources of disease innoculum and of the insect vector; and operates a disease identification laboratory. The responsibility for spraying and sanitation for control of the elm bark beetles is placed on the individual communities and land owners.

A complete report on the 1962 Dutch Elm Disease Program in Michigan has been prepared by the Michigan Department of Agriculture and is briefly summarized as follows.

The Dutch Elm Disease Regulation No. 613 was amended in 1962 to clarify and up-date its provisions. The major change is to define "Control Area" as an area wherein a political subdivision or organization is conducting a spray and sanitation program for control of the elm bark beetle. This change is predicated on the impracticability of control of the disease in rural situations, as well as in urban areas where sanitation and spraying for bark beetle control are not generally practiced. The amended regulation avoids imposing the hardship of tree removal on property owners in those areas where such removal would have little effect on controlling the disease.

The disease continues to spread through the state, having been found for the first time in 1962 in Manistee, Wexford, Lake, Isabella, Clare, Gladwin, Roscommon and Crawford counties. (See Map XI.) It is expected that this spread will continue throughout the state, as it is economically impossible to control the disease in rural areas.

During the season just completed, 15,414 calls and contacts were made, and 14,953 city blocks and 288 square miles were surveyed by inspectors of the Plant Industry Division. A total of 15,153 samples were submitted to the Identification Laboratory, with 13,071 diseased trees condemned and 9,033 dead trees condemned. These totals in no way represent the annual total loss of elm trees in the state, as recent surveys have not been conducted in rural areas for reasons previously mentioned.

The Parks Division of the Conservation Department has had a Dutch elm disease control program in its southern Michigan state parks and recreation areas since 1953.

Sanitation is carried on in the most important and developed parks and recreation areas by private contractor. In 1962, 2,187 trees were trimmed and 216 trees removed from the Metamora-Hadley, Ortonville, Rochester-Utica, and Bald Mountain recreation areas. A spray program was carried on when weather

permitted during the period from September 15, 1961 to April 15, 1962. A total of 30,852 elm trees were sprayed in 16 state parks and recreation areas in southern lower Michigan. In addition, the spray program was extended to include 1,731 trees in Bay City State Park, East Tawas State Park, Gladwin State Park and Muskegon State Park.

The survey and sampling program was completed from June 15 to September 15, with regular park personnel, along with help from the Michigan Department of Agriculture Dutch Elm Disease Identification Laboratory. During this period, 197 samples were taken and 100 of the sampled trees were infected with the Dutch elm disease. The infected trees were removed and destroyed.

WHITE PINE BLISTER RUST

A report of the white pine blister rust situation and cooperative control program is prepared annually by the Division of State and Private Forestry, Forest Pest Control Branch of the U. S. Forest Service, Milwaukee, Wisconsin. A brief summary of this report for 1962 follows:

Ribes eradication for the protection of young white pine stands was continued to the full extent of available funds. Practically all labor was provided from Corrections Department Camps, except on national forests. Trustee labor was made available from three camps in the Upper Peninsula, and four in the northern part of the Lower Peninsula.

During the eradication season, 17,930 acres were given initial ribes eradication work; 18,984 acres were reworked, and 4,072 acres on maintenance were rechecked. An expenditure of 3,037 man-days was required to do this work. Most of the control work was done on state forests.

At the present time there are about 505,056 acres of white pine type in Michigan and 1,331,172 acres of control area mapped in the northern counties. Natural reseeding is constantly expanding the acreage of the type. Approximately 48 percent of the mapped white pine is on maintenance and will require only an occasional examination. About 53 percent of the white pine on state forests is on maintenance, but only 37 percent for private ownership. The maintenance figure for national forests is about 88 percent.

During 1962, ribes infection was generally lighter than normal.

* * *

SUMMARY

Jack pine budworm defoliation decreased sharply in severity in 1962. Surveys following the 1961 defoliation showed two major areas of infestation on state land, one in Baraga County and the other in Grand Traverse. Plans to spray these areas on state land were canceled in 1962 when surveys indicated a population decline. Populations remained high on the Hiawatha National Forest, necessitating the aerial spraying of 12,500 acres.

Injury caused by the white pine weevil rose slightly in 1962 after a small decline in 1961. This insect is found throughout the state, except in the extreme southeastern portion, and is responsible for considerable deformation of white, Scotch and jack pines, and to a lesser extent the other pines and spruces. Jack pine on 463 acres of state land was sprayed by inmate crews using knapsack sprayers.

Damage by the European pine shoot moth was the most severe in the southern half of lower Michigan and northward in the counties nearest the Great Lakes. In many parts of the state the shoot moth persists but causes little damage.

Following the sudden collapse in the red-headed pine sawfly population in northwestern lower Michigan in 1961, the populations remained at a low level in 1962. Only 180 acres were aerially sprayed to control the sawfly in pine plantations on state land.

Saratoga spittlebug populations declined slightly in 1962, and no control action was undertaken on state land. Aerial application of DDT to 680 acres of the Lower Michigan National Forest was necessary to prevent serious damage to pine plantations.

Anomala beetle infestations in northwestern lower Michigan were spotty, with some plantations heavily defoliated and others with no apparent damage.

Populations of the larch sawfly were down considerably in 1962. Following a high in the current outbreak in 1959, the populations declined in 1960, rose slightly in 1961 and again declined in 1962. The stands are continuing to survive, although in a weakened condition with slower growth.

A continued increase in the European pine sawfly defoliation in southern lower Michigan was noted.

Forest tent caterpillars were found in most aspen and maple stands in northern lower Michigan, although, as yet, general defoliation was not apparent. Indications of the beginning of another outbreak in northern Michigan are apparent.

Trees killed by the pine root collar weevil continue to show up in new locations and in increasing numbers. Damage has been particularly serious on the western side of lower Michigan. Tree mortality has occurred in plantations as young as six years old and as old as 30 years.

White grubs killed over 90 percent of a fall 1961 planting in Marquette County. In other places, the pine trees planted on 5,456 acres of state land in 1962 were treated with aldrin to prevent grub damage. Results of this treatment have been very satisfactory in preventing loss due to grub feeding.

The Zimmerman pine moth, eastern tent caterpillar, aspen leaf rollers, jack pine shoot borer and other insects caused damage or defoliation of local concern.

Oak wilt aerial surveys were again greatly curtailed in 1962. In the four counties which have had continuous survey and treatment during the six years of the program, it has been shown that the number of active locations has been reduced 81 percent and the number of infected trees has been reduced 77 percent.

The Dutch elm disease was identified in eight additional counties in northern lower Michigan during 1962, and is now known to be as far north as Crawford County in lower Michigan. Communities carrying on a complete spray and sanitation program are now called "control areas" and condemned trees must be removed and destroyed in these areas only.

The white pine blister rust control program continued in Michigan, with 17,930 acres given initial ribes eradication treatment, 18,984 acres reworked, and 4,072 acres on maintenance rechecked.

* * *